

**"MARKED-UP" TEXT PURSUANT TO 37 C.F.R. § 1.121**

Paragraph beginning at page 9, line 28 and ending at page 10, line 3 (note emphasis in original):

Those of ordinary skill in the art will appreciate that programmable element 43 is conventionally used for storage of binary digital data (where charge is either stored on floating gate 52 or is not). However, it has been shown in the prior art that such devices can be used for the purposes of storing analog data, where not merely the presence or absence of charge can be detected, but further where the level of stored charge can be detected when "reading" the cell. See, for example, Min-hwa Chi et al., "Multi-Level Flash/EPROM Memories: New Self-Convergent Programming Methods for Low-Voltage Applications," *IEEE IEDM*, 1995. [**<< Inventors: Can you provide more complete bibliographic information about this reference? >>**]

1. (once amended) A cathodoluminescent element comprising:

at least one emitter;

a first transistor having a first terminal coupled said at least one emitter, a second terminal coupled to a ground potential, and a gate terminal, said first transistor being responsive to a first voltage applied to said gate terminal to selectively establish a first conductive path for a first current between said at least one emitter and said ground potential;

a programmable element having a first terminal coupled to a first select line to receive a first select signal, a second terminal coupled to said gate terminal of said transistor, and a gate terminal coupled to a second select line, said programmable element being responsive to assertion of a second select signal on said second select line to selectively establish a second conductive path for a second current between said first select line and said gate terminal of said transistor, thereby applying said first voltage to said gate terminal of said transistor;

wherein said programmable element comprises a charge storage element for storing a level of electrical charge;

and wherein the conductivity of said second conductive path varies in relation to said level of electrical charge such that the magnitude of said first voltage relative to the magnitude of said second select signal varies in relation to said level of electrical charge.

10. (once amended) A field emission display, comprising an array of cathodoluminescent elements each comprising:

at least one emitter;

a first transistor having a first terminal coupled said at least one emitter, a second terminal coupled to a ground potential, and a gate terminal, said first transistor being responsive to a first voltage applied to said gate terminal to selectively establish a first conductive path for a first current between said at least one emitter and said ground potential;

a programmable element having a first terminal coupled to a first select line to receive a first select signal, a second terminal coupled to said gate terminal of said transistor, and a gate terminal coupled to a second select line, said programmable element being responsive to assertion of a second select signal on said second select line to selectively establish a second conductive path for a second current between said first select line and said gate terminal of said transistor, thereby applying said first voltage to said gate terminal of said transistor;

wherein said programmable element comprises a charge storage element for storing a level of electrical charge;

and wherein the conductivity of said second conductive path varies in relation to said level of electrical charge such that the magnitude of said first voltage relative to the magnitude of said second select signal varies in relation to said level of electrical charge.

18. (once amended) A method of operating a cathodoluminescent element comprising an emitter selectively coupled to ground in response to application of a predetermined voltage to the gate of a transistor, said method comprising:

(a) conditioning a programmable element associated with said cathodoluminescent

element to level compensate a first select signal to said [first] predetermined voltage level in response to application of a second select signal to a gate terminal of said programmable element;

- (b) applying said level-compensated first select signal to said gate of said transistor.

22. (once amended) A method of operating a field emission display comprising an array of cathodoluminescent devices each comprising an emitter selectively coupled to ground in response to application of a predetermined voltage to the gate of a transistor, said method comprising:

- (a) for each cathodoluminescent element in said array, conditioning an associated programmable element to level compensate a first select signal to said [first] predetermined voltage level in response to application of a second select signal to a gate terminal of said programmable element;
- (b) applying said level-compensated first select signal to said gate of said transistor in response to application of said second select signal to said gate terminal of said programmable element.

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REMARKS

1. *Status of the Application.* Claims 1-55 are pending in the application. In the Office Action, claims 1, 10, 18, and 22 were rejected under 35 U.S.C. § 112, and claims 1-55 were rejected under 35 U.S.C. § 103. Claims 1, 10, 18, and 22 are amended herein. No new matter is added by way of these amendments. Further, it is submitted that the amendments were not made for reasons of patentability.

2. *The Section 112 Rejections.* Claims 1, 10, 18, and 22 were rejected under 35 U.S.C. § 112. According to the Office Action, there is insufficient antecedent basis for the recitation of a "first transistor" in claims 1 and 10. Claims 1 and 10 have been amended herein to provide proper antecedent basis for all recitations. Reconsideration and withdrawal of the § 112 rejection of claims 1 and 10 is therefore requested.

Further, the Office Action states that there is insufficient antecedent basis for the recitation "first voltage" in claims 18 and 22. Claims 18 and 22 have been amended herein to provide proper antecedent basis for all recitations. Reconsideration and withdrawal of the § 112 rejection of claims 18 and 22 is therefore requested.

3. *The Section 103 Rejections.* Claims 1-4, 9-12, 16-29, 34-40, and 44-55 were rejected under 35 U.S.C. § 103(a) as being unpatentable over allegedly "admitted prior art" in view of an article by Min-hwa Chi entitled "Multi-Level Flash/EPROM Memories: New Self-Convergent Methods for Low-Voltage Applications" ("*Chi*"). This rejection is respectfully challenged.

A rejection based on §103(a) must establish three basic criteria in order to establish a *prima facie* case of obviousness. "First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art to modify the reference or combined referenced teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach

or suggest all the claim limitations.” MPEP §§706.02(j); *see also* 2142. Specifically, since “invention itself is the process of combining prior art in a non-obvious manner,” to establish obviousness the “Examiner must show reasons that the skilled artisan, confronted with the same problems as the inventor and with no knowledge of the claimed invention, would select the elements from the cited prior art references for combination in the manner claimed.” *In re Rouffet*, 47 USPQ2d 1453, 1458 (Fed. Cir. 1998). Examiners are forbidden from “the use of hind-sight in the selection of references that comprise the case of obviousness.” *Id.*

As with all rejections, the burden is on the Examiner to establish an “unrebutted *prima facie* case of obviousness.” *Id.* at 1455. “An applicant may specifically challenge an obviousness rejection by showing that the [Examiner] reached an incorrect conclusion of obviousness or that the [Examiner] based its obviousness determination on incorrect factual predicates.” *Id.* The Assignee respectfully submits that the Examiner has not presented a *prima facie* case of obviousness as to the present rejections.

In the present case, the Assignee specifically takes issue with the Office Action’s vague characterization of certain portions of the specification of the present application (“the Specification”) as “Admitted Prior Art” or “APA.” The Office Action appears to identify “page 1-2 and 7-9” of the present application as “Admitted Prior Art.” As to “page 1-2,” this is the “Background of the Invention” section of the application, and contains a background discussion of the problems associated with non-uniformity among a plurality of cathodoluminescent devices. According to the Specification, “FED systems which additionally incorporate infrared-sensitive elements giving the systems additional capabilities and functionality are even more susceptible to uniformity problems.” Specification, p. 2, lines 12-14. It is suggested that “[n]on uniformity in the performance among a plurality of cathodoluminescent devices can be compensated for with appropriate pixel-by-pixel adjustment.” *Id.* p. 2, lines 22-24. Further, the Specification observes that “it may be undesirable to require external circuitry to compensate for non-uniformity in FED pixels.” *Id.*, lines 25-26.

It is submitted that, whether or not pages 1-2 of the Specification constitute prior art to the invention, there is nothing of substance on pages 1-2 of the Specification that teaches or

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suggests the claimed invention. Thus, the Office Action's characterization of pages 1-2 as "Admitted Prior Art" is moot.

Regarding pages 7-9, the Assignee respectfully but forcefully submits that certainly not *all* of pages 7-9 constitute prior art to the present invention. On page 7, beginning at line 6, the Specification discusses a "conventional cathodoluminescent element control arrangement" with reference to Figure 8. For the remainder of page 7 through page 8, line 2, the operation of the cathodoluminescent element of Figure 8 is described. Then, beginning on page 8, line 3, the known problems of process variation leading to non-uniformity in FEDs is described. On page 8, beginning at line 22, the Specification states that "one method of addressing the uniformity problem involves compensating for process variation through careful adjustment of the voltage level of the column select signal applied to gate terminal 48 of transistors 42 in each element 10 in an array." Specification, page 8, lines 22-24. The Specification concludes this discussion by noting that "[a] perceived drawback to the aforementioned method of improving uniformity among an array of cathodoluminescent elements 10 is the additional circuitry and processing overhead required by such an approach."

Next, on page 9, beginning at line 9, one embodiment of the invention is described. Therefore, lines 9 through 33 of page 9 cannot be characterized as Admitted Prior Art. The remaining portions of pages 1-2 and 7-9 discuss conventional FED devices and the problems associated with non-uniformity due to process variation. Thus, it is not believed that these portions of the Specification in any way support the § 103 rejection.

The Office Action unmistakably runs afoul of the aforementioned prohibition against hindsight reconstruction of the prior art. The Office Action makes the conclusory assertion that "it would have been obvious for one of ordinary skill in the art at the time of the invention was made to provide the method of programming for storing threshold voltage disclosed by Chi in the APA device." In support of this assertion, the Office Action states only that this is so "because [the *Chi* methods] would be promised for future generations of high density flash memory." The Office Action makes no attempt to support its assertion that persons of ordinary skill in the art would have any motivation to combine a conventional cathodoluminescent device with the

teachings of *Chi* to achieve the invention disclosed and claimed in the instant application. *Chi* itself provides no suggestion whatsoever of utilizing the flash/EPROM memory it discloses as a programmable element for a cathodoluminescent display. Absent such a suggestion to combine two so clearly disparate prior art references, it is respectfully submitted that the § 103 rejection is improper and cannot stand. Reconsideration and withdrawal is therefore requested.

Claims 5-8, 13-15, 30-33, and 41-43 were rejected under § 103 "as being unpatentable over the "APA" in view of *Chi* and further in view of [U.S. Patent No. 6,181,308 to] Cathey, Jr. et al." ("*Cathey*"). For all of the reasons articulated above with regard to the proposed hypothetical combination of "APA" and *Chi*, it is submitted that such rejection is unsupported and cannot stand.

*Cathey* appears to relate to methods of controlling the amount of current through emitters in a cathodoluminescent display by providing "a current-limiting resistance between the conductive layer [extraction grid] and the emitters." *Cathey*, col. 2, lines 28-29. Notably, *Cathey* neither teaches nor suggests any method for controlling the voltage of the row select or column select transistor gates. Indeed, *Cathey* does not even contemplate the undesirable approach of storing a unique voltage information for each pixel in a display, as discussed in the specification of the present application at page 8, line 30 through page 9, line 8. Inasmuch as *Cathey* on the one hand fails to propose even a less desirable approach than the present invention, it most certainly cannot on the other hand be characterized as disclosing the more desirable approach of providing a programmable element for each pixel in a display, as disclosed and claimed in the present application. *Cathey* appears to emphasize the desirability of maintaining a *constant* current through the emitter, but does not address the issue of emitter-to-emitter variations in current resulting from process variation and the like. Thus, *Cathey* simply adds nothing to the proposed hypothetical combination of "APA" and *Chi*, a combination which, as discussed above, itself fails to teach or suggest the invention disclosed and claimed in the present application.

Analysis of the specific claims at issue shows indisputably that the failure of the proposed hypothetical combination of "APA," *Chi*, and *Cathey* to teach or suggest a cathodoluminescent display in accordance with the present invention. Considering first claims 1 and 10, it is clear that

the proposed combination, even if made, fails to teach or suggest to persons of ordinary skill in the art several featured elements of the claim. For example, nowhere in "APA," *Chi*, or *Cathey* is "a programmable element having a first terminal coupled to a first select line to receive a first select signal." *Chi* arguably discloses a programmable element, but this is the extent of *Chi*'s similarity to the present invention. As noted above, neither *Chi*, nor "APA," nor *Cathey*, taken either singly or in combination, teaches or suggests providing a programmable element in a cathodoluminescent device.

Further, none of the cited art teaches a cathodoluminescent device in which, as required by claim 1, "the conductivity of [the electrode's current path] varies in relation to [a] level of electrical charge [stored in the programmable element]. *Cathey* appears to propose establishing a resistive element (a "current limiting resistance") in the electrode path. See, e.g., *Cathey*, col. 2, lines 20-42. However, *Cathey* strives to maintain a **constant** resistive value, as opposed to establishing a **variable** resistive value. To this extent, therefore, *Cathey* tends to teach **away** from the present invention.

Considering claims 18 and 22, it is clear that neither the "APA," *Chi*, nor *Cathey*, taken either singly or in combination, discloses "conditioning a programmable element associated with a cathodoluminescent element to level-compensate a first select signal to [a] voltage level in response to application of a second select signal." None of the cited prior art discloses a programmable element, and none of the cited prior art discloses level-compensation of a select signal to a desired voltage level.

Considering claims 26 and 37, it is similarly clear that the cited art fails to teach or suggest a "programmable element," and none of the art teaches or suggests that a programmable element is "responsive to activation of [a] control signal to adjust [the] predetermined voltage level of [a] select signal by a preprogrammed amount."

Considering claim 49, none of the cited art discloses "a programmable element." Nor does the prior art teach or suggest that a programmable element is associated with each cathodoluminescent element in an array and that each programmable element "determin[es] a



level of voltage adjustment to [a] select signal, such that the programmable element determines the intensity of light emitted from [a] phosphor layer."

Claim 53 also recites a "programmable element" neither taught nor suggested by the prior art. More notably, however, claim 53 calls for "pre-programming [the] programmable element to specify the intensity of light emitted by [the] display ... in response to application of [a] select signal." This is clearly neither taught nor suggested by the prior art.

In light of the fact that each of the independent claims in the subject application recites elements neither taught nor suggested by the prior art, it is respectfully submitted that the § 103 rejection of these claims, and hence the § 103 rejection of the claims dependent from these claims, cannot stand. Reconsideration and withdrawal of the § 103 rejections is therefore requested.

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CONCLUSION

In view of the foregoing amendments and remarks, it is believed that each of the pending claims in the present application recites subject matter neither taught nor suggested by the prior art, and that the application as a whole is in proper form and condition for allowance. Reconsideration and withdrawal of the objections and rejections is therefore requested, such that the application may advance to issue at the earliest possible date. If the Examiner believes that the application can be placed in even better condition for allowance, he is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,

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